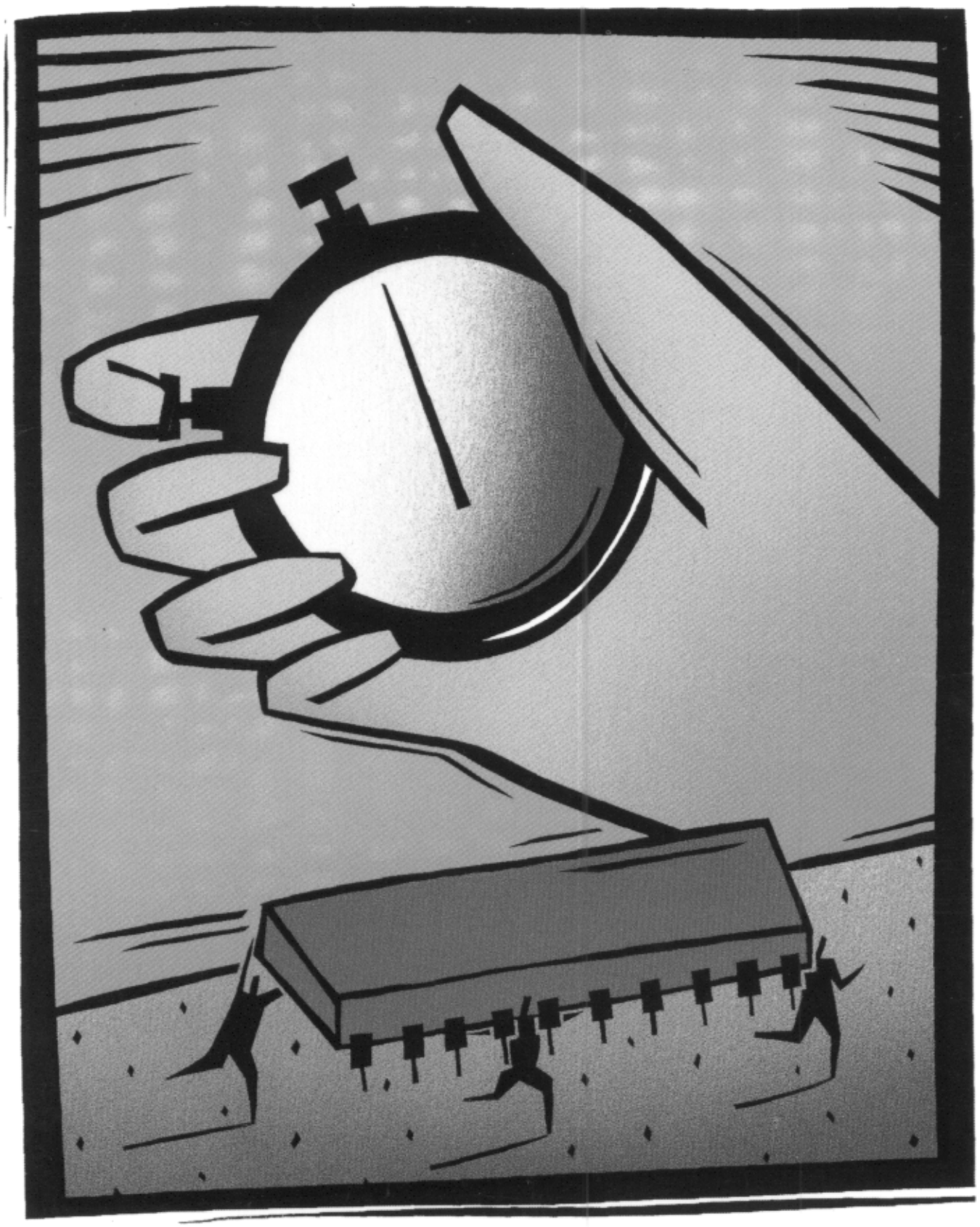
BUILD YOUR OWN

PENTIUM® PRO PROCESSOR PC



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AUBREY PILGRIM

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Introduction

Every day more and more ways are being found to use the computer. In most cases, the technology is making life simpler and better for all of us. However, quite often, computers are being used to take over and perform jobs that were once done by human beings. For example, most offices have replaced receptionists with telephone answering machines using voice recognition and voice emulation. Many large factories have installed robots to do jobs that humans once did. As each job is taken over by a computer, the displaced person must learn to do something else and compete for a new job or face unemployment. The competition for available jobs is becoming more of a problem every day.

Build your own and join the revolution

So what is a person to do? You can join the computer revolution and learn all you can about them, or you can face the possibility of being a casualty. One of the better ways to learn about computers is to build your own. This book can help you learn about computers, and even save you a bit of money.

Thomas Alva Edison helped start the present day revolution when he recorded sound on his cylinder wax records. Of course, without any electronic means to amplify the sound, it was rather crude. The vacuum tube was developed a few years later, which put us in an evolution like nothing ever seen before in the history of the world. Soon we had amplified sound, radio, movies, and then TV. Today we have computers that can include all of those technologies and more.

The computer was originally developed to solve mathematical problems. (According to the American Heritage Dictionary, the word *compute* means to "determine by mathematics.") However, it now does much more than that. Besides being a fantastic mathematical problem solver, a computer can record and recall text, graphics, photos, and music. With a modem, it can allow you to communicate with anyone else anywhere in the world who has a computer and modem. It can output speech

and recognize spoken commands. Computers are becoming smarter every day and becoming more adept at artificial intelligence. It's enough to give a person an inferiority complex to think that a piece of machinery might be smarter than he or she is.

We have truly become a jaded society. At the time of Thomas Edison, the sight of a bare ankle caused men to become very excited. Women wore high-top shoes and long dresses to deprive men of this scandalous and forbidden pleasure. Today we can go to the beach and see near or total nudity and scarcely an eyebrow will be raised.

We have also become jaded as far as computers are concerned. A few years ago, we were very excited if we could get our hands on a computer with 64K of memory and two floppy drives that could format and read 140K single-sided disks. Today, a 200MHz Pentium Pro computer with 128Mb of memory and a couple of 9GB hard disks hardly causes anyone to give it a second glance.

Moore's Law

Of course not everyone needs or can afford a top-of-the-line Pentium Pro such as this, but they are available. Besides, at this time, a computer such as this is still rather expensive. If you can wait a couple of years, they might be no more expensive than what an obsolete and lowly 486 costs today. At this very moment, Intel is busily working on the next generation P7 chip. This chip will almost double the number of transistors and power of the Pentium Pro.

A few years ago, a man named Moore studied the microprocessor industry and noticed a very definite trend. He observed that the 286 had 125,000 transistors, more than three times the 29,000 in the XT. Very soon the 386 was introduced with 275,000 transistors, which more than doubled the 286. Then came the 486 with 1.2 million, then soon after the Pentium with 3.1 million, and now the Pentium Pro with 5.5 million. The new P7 will have over 10 million transistors.

The trend is that every 18 months or so the number of transistors and computing power more than doubles. This trend has become so predictable that it is now known as Moore's Law.

Intel said at one time they would eventually have microprocessors with 100 million transistors. According to Moore's Law, it will only take another three or four generations to reach that level, which should occur sometime within the next five or six years. What a fantastic era we are living in.

Ease of assembly

Despite the extraordinary power of the Pentium Pro, anyone can assemble one. You don't have to be an engineer or electronic technician or know anything at all about electronics or computers. The components all plug together, so there is no need for any soldering. There is also no need for any electronic testing or tuning. The only tools that you will need are a couple of screwdrivers and perhaps a pair of long-nose pliers. Figure I-1 shows some of the tools that you might need. You might not need the wire strippers in the center. You probably won't need the filler for the blank slots on the back of your computer case. However, if you ever have to remove any of the plug-in chips, it makes a great tool for prying them up.

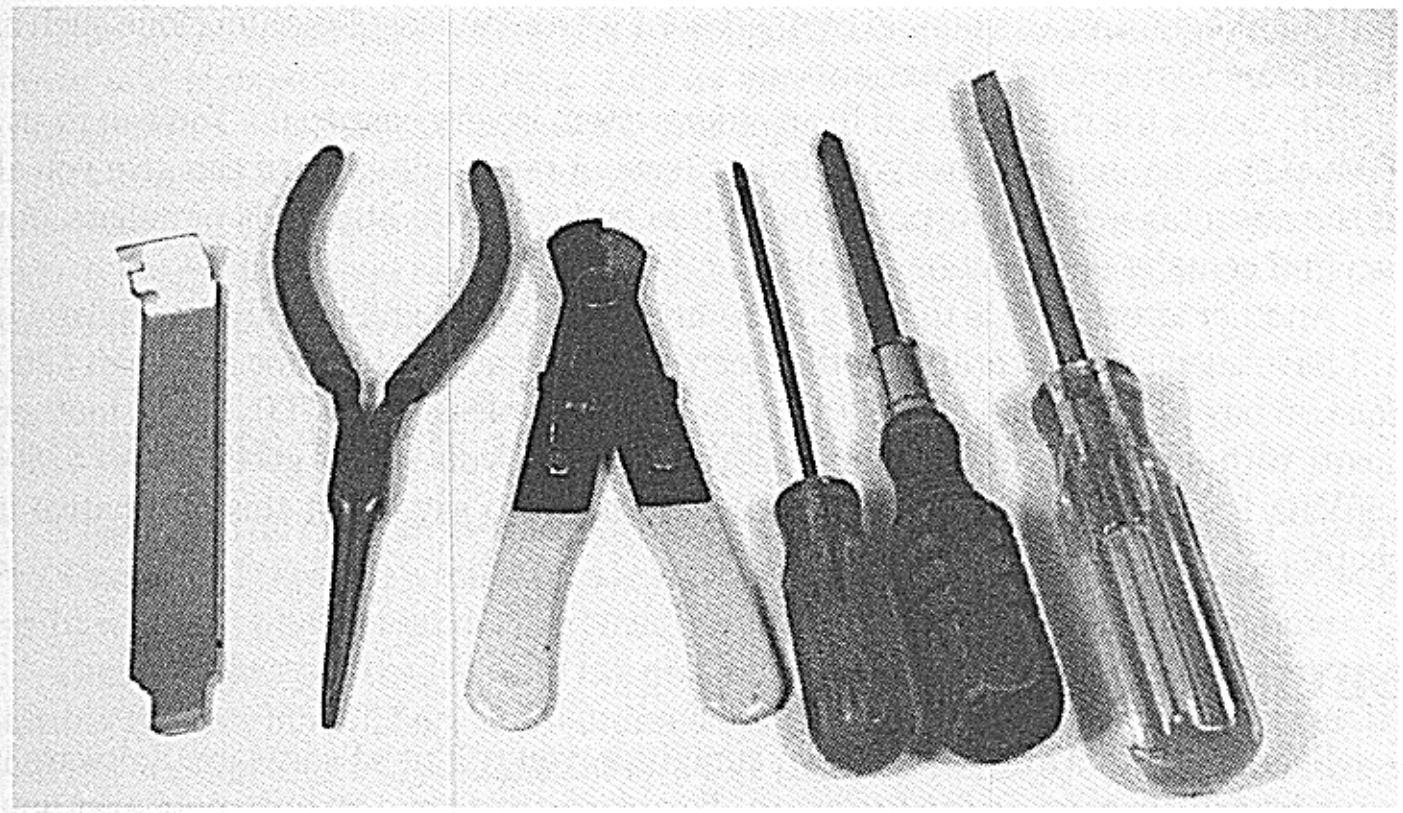

Fig. I-1 Tools needed to assemble a Pentium Pro.

Except for the motherboard, the Pentium Pro will use the same basic components as all of the previous Industry Standard Architecture (ISA) or IBM compatible computers. The Pentium Pro is no more difficult to assemble than an old XT. In fact, a Pentium Pro is even easier to assemble because we now have *Plug and Play*. I have spent many hours in the past trying to install things such as modems, sound cards, and even something as simple as a mouse. Plug and Play will make it much easier.

Do you really need a Pentium pro?

There are a lot of people like me who yearn to be the first to own anything that is new. It is called *technolust*. This character flaw has cost me a lot of money. Almost always, anything newly introduced will cost much more. I paid $4450 for my first 486 motherboard that operated at a blazing 25MHz. Today I can get a 486 motherboard that operates at 120MHz for less than $200. The 200MHz Pentium Pro motherboard that I used as a guide to write this book cost $2500. I am sure that, if I had waited for a while, it would probably cost about one-third that amount.

The point is that, if you don't need all of the power of a Pentium Pro at this time, you might be better off waiting for a while. There are still lots of things that you can do with a low-cost 486 or a Pentium. However, just because you might not need a Pentium Pro at this time, don't let that stop you from buying this book. Even if you don't build your own, this book can help you learn a lot about computers.

Upgrading an older computer

If you have an older computer, you can easily upgrade it. Just pull out the old motherboard and replace it with a new Pentium Pro motherboard. If you are a bit

short of money, replace your old motherboard with a low-cost Pentium clone such as those from Cyrix or AMD/NexGen.

Replacing the motherboard in an older system is very easy to do. You can re-use most of the components that you already have. A new motherboard can give you all of the advantages of a new powerful system and save you hundreds of dollars. You can find complete instructions in chapter 3.

Another alternative is to buy a Pentium motherboard and install a Cyrix 6x86 in it. I have seen some Pentium motherboards for sale at this time for less than $200. You can buy a Cyrix 6x86 P150 CPU for $469 and, for less than $700, have a motherboard with almost all of the computing power that you would get from an $1800 150MHz Pentium Pro motherboard. I'll have more to say about this alternative in chapter 3.

Saving on software

Even if you don't build your own computer, you will need software. Software is every bit as necessary as the hardware. Just as you can't run an automobile without gasoline, you can't run a computer without software. Some software packages can be very expensive. The information in chapter 16 about Surplus Software can help you save hundreds of dollars.

Overcoming obsolescence

Intel, IBM, Microsoft, General Motors, and all other manufacturers spend millions of dollars each year to develop newer and better models. You might not believe this, but Intel is not spending a lot of money developing the P7 just because they like you and want you to have the latest and best. The reason that they are pushing new products out the door, even before you get home with your latest purchase, is primarily to make obsolete the product that you just bought. They institute high-powered sales campaigns to convince you that you shouldn't be caught dead with the product that was the latest and greatest just yesterday. However, if you buy this new product, it will make you happy beyond belief. After all, if you are satisfied with yesterday's product, then you won't buy a new one.

Another major reason for the constant change is the competition. The competition is always trying to convince you that their product is much better than the other guy's. To stay in business, they must continually offer you something that the other guy doesn't give you.

A third major reason for change is because of technolust. There are many people in this world who must have the latest and greatest even if it means that the kids have to go without a $90 pair of sneakers. I hate to admit it, but I am one of those people who is frequently overcome with lust when I see a powerful new computer.

I am probably committing some kind of sin when I lust in my heart, but I don't care. Because I can't afford to buy some of the new technology stuff, I build my own.

Due to the major forces listed here, the companies must constantly revise, improve, and change their products. Just as surely as change is necessary and inevitable with a new baby, so it is with technology.

If you know what is inside your computer, you won't have to buy a new one every other day. You can just buy the necessary items that will be needed to upgrade and make it every bit as good or better than the latest ones. It is very easy to do. Anyone can do it. This book will show you how.

How this book is organized

Chapter 1 will have an overall discussion of the major components in a Pentium Pro. Chapters 2 through 9 will discuss each of the major components in detail. Chapter 10 will have photos and detailed instructions on how to assemble a computer.

I suggest that you read each of the chapters before buying your components and starting the assembly. There are hundreds of different components that you can install in your computer to configure it any way that you want to. That is what makes a computer so fantastically versatile. If you are fairly new to computers, these chapters can help you decide what to buy.

If you decide to buy a fully assembled system, you probably will want certain components installed in it, depending on what you are going to use it for. This book can help you determine what to buy.

The future

We are living in a digitized world. This world allows us to digitize data, photos, movies, sound, speech, music, and virtual reality. Once these objects are digitized, we can change them, compress them, add to them, or manipulate them in hundreds of ways. There are some people who might be unhappy with this digitized world. They might complain that it's not really real. These people had better learn to live with it. It is the vanguard of the future. The Pentium Pro will help make it happen.

"The neat thing about Pilgrim's **Save a Bundle** *series of books is that they are written for people who aren't engineers or tinkerers. Even if you're not very handy with tools . . . he takes you through the process step by step."*

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